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10/701,183	11/04/2003	Hylke Akkerman	100.2498	5025

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PRIEST & GOLDSTEIN PLLC  
5015 SOUTHPARK DRIVE  
SUITE 230  
DURHAM, NC 27713-7736

EXAMINER

NGUYEN, THANH T

ART UNIT PAPER NUMBER

2813

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/701,183

**Applicant(s)**

AKKERMAN ET AL.

**Examiner**

Thanh T. Nguyen

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 14-18 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/16/04, 7/6/05.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of group I, claims 1-13, 19 in the reply filed on 5/20/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Information Disclosure Statement***

The information disclosure statements filed on 6/16/04, 7/6/05 has been considered.

### ***Oath/Declaration***

Oath/Declaration filed on 11/4/03 has been considered.

required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-8, 10-11, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Katz (U.S. Patent No. 6,403,397).

Referring to figures 1-2, Katz teaches an integrated circuit, comprising:

a dielectric layer comprising a surface, a portion of said surface having exposed aromatic groups;

a polycrystalline semiconductor layer comprising an organic semiconductor composition overlying and in contact with said portion of said surface, said organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety;

a gate electrode;

a source electrode; and

a drain electrode;

said source and drain electrodes being in spaced apart conductive contact with a channel portion of said semiconductor layer, said gate electrode being positioned to control a conductivity of said channel portion.

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Regarding to claim 2, each of said moieties comprises on average at least about three conjugated aromatic rings (see col. 4, lines 1-23).

Regarding to claim 3, the alkyl chains comprise on average between about 3 and about 12 carbon atoms (see col. 4, lines 1-23).

8. in which each of said moieties comprises on average between about three and about six conjugated aromatic rings (see col. 4, lines 1-23).

Regarding to claim 10. the channel portion has an on/off ratio of at least about 100 (see table, col. 7-8).

11. the semiconductor composition comprises a member selected from the group consisting of: 5,5'-Bis(4-n-hexylphenyl)-2,2'- bithiophene; 5,5"-Bis(4-a-hexylphenyl)-2,2":5",2"-terthiophene; 5,5""-Bis(4-n-hexylphenyl)- 2,2':5',2":5" ,2""-quaterthiophene; 1,4-Bis[5-(4-n-hexylphenyl)-2-thienyl]benzene; 2,5-Bis[4(4'-hexylphenyl)phenyl]thiophene; 5,5""-Bis(4-n-hexyl)-2,2":5', 2':5",2""-quaterthiophene; 5,5""-Bis(4-n-hexyl)-2,2':5', 2"-5" 2"":5"" ,2""-pentathiophene; 1,4-Bis((5-n-hexyl)-2,2'-bithienyl]benzene; 2,6-bis(5-hexylthien-2-yl)naphthalene; and mixtures(see col. 4, lines 1-23).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 4-6, 9, 2-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katz (U.S. Patent No. 6,403,397) as applied to claims 1-3, 7-8, 10-11, 19 above in view of Klauk et al., High-mobility polymer gate dielectric pentacene thin-film transistors, Journal of applied physics, November 1, 2002, pages 5259-5263, Vol. 92, Number 9 (cited by applicant), and Mushrush et al., Easily processable Phenylene-Thiophene-based organic field-effect transistors and solution-fabricated nonvolatile transistor memory elements, J. Am. Chem. Soc., 2003 pages 9414-9423, Vol. 125, Number 31 (cited by applicant).

Katz teaches forming a dielectric layer and forming a polycrystalline semiconductor on the dielectric layer. However, the reference does not teach dielectric layer is formed from a precursor composition of the group consisting of naphthalenes, styrenes, phenols, and cresols of poly(4-vinylphenol-co-2-hydroxyethyl methacrylate) which has a refractive index of at least about 1.52, the semiconductor composition comprises 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene and the specific crystal size, and mobility of the semiconductor layer.

Klauk et al. teaches a forming an organic thin-film transistor, wherein forming a dielectric layer by using poly(4-vinylphenol-co-2-hydroxyethyl methacrylate) (see page 5259). It is obvious that the same material would form a layer with a refractive index of at least about 1.52.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a dielectric layer is formed from a precursor composition of the group consisting of naphthalenes, styrenes, phenols, and cresols of poly(4-vinylphenol-co-2-hydroxyethyl methacrylate) which has a refractive

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index of at least about 1.52 in process of Katz as taught by Klauk et al. because the process would form a device with large carrier mobility, low threshold voltage, low subthreshold swing, and large on/off current ratio (see page 5262).

Mushrush et al teach forming an organic field effect transistors wherein forming an organic semiconductor layer by using 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene (see abstract, page 9414 and 9416).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form an organic semiconductor layer by using 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene in process of Katz as taught by Mushrush et al. because the material would provide a transistor with high carrier mobility, low leakage current, straightforward synthesis, facile film deposition, and chemical stability.

It would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made to optimize the concentration of hydrogen within the dielectric layer, since it has been held that where the general conditions of a claim are disclosed in the prior art (i.e.- semiconductor crystal size of at least about 0.1 micrometer, polycrystalline semiconductor layer has a mobility of at least about 0.1 centimeters squared per volt-second), discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955).

The specification contains no disclosure of either the critical nature of the claimed arrangement (i.e.- semiconductor crystal size of at least about 0.1 micrometer, polycrystalline semiconductor layer has a mobility of at least about 0.1 centimeters squared per volt-second) or any unexpected results arising therefrom. Where patentability

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is said to be based upon particular chosen limitations or upon another variable recited in a claim, the applicant must show that the chosen limitations are critical. In re Woodruff, 919 F.2d 1575, 1578 (FED. Cir. 1990).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would forming the semiconductor layer with semiconductor crystal size of at least about 0.1 micrometer and a mobility of at least about 0.1 centimeters squared per volt-second in process of Katz in order to optimize the process.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (See MPEP 203.08).



Thanh Nguyen